Fluoride Levels at Portales, Blackwater Draw and Oasis State Park

Katherine R. Hamilton

Department of Geology, Eastern New Mexico University, 5309 N. Prince, Clovis, NM, 88101, hamilk02@enmu.edu

Fluoride is a naturally occurring element in water, contributed from surrounding geological formations. Portales and surrounding water supplies are drawn from an ancient aquifer where the water has been housed for a long time. Ionic exchange between the water and surrounding rocks has resulted in high levels of fluoride. Portales and surrounding area water supplies have tested close to the U.S. EPA standards for 4 ppm for fluoride. Portales Water Suppliers issue an annual drinking water quality report, listing high fluoride levels as an area of concern. Fluoride is beneficial to bone growth in small amounts (up to 1 ppm). In higher concentrations, mottling of teeth may appear in young children, which is the first manifestation of dental fluorosis. Long term exposure to fluoride may result in skeletal fluorosis, extreme cases resulting in painful bone deformities, and eventual death. Fluoride affects bones, soft tissue, and vital organs. Water samples were taken from each of the sites in order to verify concentration levels. Fluoride concentrations were measured using the EPA-approved method of ion selective electrode electrochemistry. All sites tested indicate levels of fluoride that are near EPA Primary Standard levels. All surpass EPA Secondary Standards. Oasis State Park Lake came in at almost twice the concentration levels of the other test sites as the result of ion evaporative concentration. In order to determine the source of contamination, many factors must be considered. There are 3 layers of volcanic ash that were deposited from active volcanos during the early history of New Mexico. The Gueje pumice, the Cerro Toledo tephra or the Tsankawi pumice may contribute fluoride. Climate change can affect weather patterns, bringing periods of scant rainfall, causing the buildup of toxins in soil. These toxins remain until they are washed away by precipitation. Clay soils may contribute fluoride as a result of capillary action. Portales has an agricultural based economy, so agricultural fertilizer runoff may contribute to the problem. All of these factors work together to cause the high concentrations of fluoride found in our water.

References:


Keywords:

fluorosis, ion selective electrode electrochemistry, contaminants, climate change